Release 331 Quadro, NVS, Tesla, & GRID Drivers for Windows - Version 332.50

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Windows Vista, WIndows 7, Windows 8, & Windows 8.1

Release Notes

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01 INTRODUCTION TO RELEASE NOTES

This edition of *Release Notes* describes the Release 331 family of NVIDIA Quadro, NVS, Tesla, and GRID Drivers for Microsoft® Windows® Vista and later[1]. NVIDIA provides these notes to describe performance improvements and bug fixes in each documented version of the driver.

Structure of the Document

This document is organized in the following sections:

- "Release 331 Driver Changes" on page 2 gives a summary of changes, and fixed and open issues in this version.
- "The Release 331 Driver" on page 29 describes the NVIDIA products and languages supported by this driver, the system requirements, and how to install the driver.
- "Mode Support for Windows" on page 38 lists the default resolutions supported by the driver.
- "NVIDIA Tesla Compute Cluster Mode" on page 44 describes the Tesla Compute Cluster mode.

Changes in this Edition

This edition of the *Release Notes* for Windows Vista and later includes information about NVIDIA graphics driver version 332.50, and lists changes made to the driver since version 320.92. These changes are discussed beginning with the chapter "Release 331 Driver Changes" on page 2.

1. Includes Windows Vista, Windows 7, Windows 8, and Windows 8.1.

02 RELEASE 331 DRIVER CHANGES

This chapter describes open issues for version 332.50, and resolved issues and driver enhancements for versions of the Release 331 driver up to version 332.50. The chapter contains these sections:

- "Version 332.50 Highlights" on page 3
- "Advanced Instructions for this Release" on page 7
- "Changes in Version 332.50" on page 13
- "Changes in Version 332.21" on page 14
- "Changes in Version 331.82" on page 15
- "Changes in Version 331.65" on page 16
- "Open Issues in Version 332.50" on page 17
- "Not NVIDIA Issues" on page 18
- "Known Product Limitations" on page 23

Version 332.50 Highlights

This section provides highlights of version 332.50 of the NVIDIA Release 331 Driver for Windows Vista and later.

- Existing Support
- What's New in Release 331
- What's New in Version 332.50
- Discontinued and Unsupported Features in this Release
- Limitations in This Release

Existing Support

This release supports the following APIs:

- Open Computing Language (OpenCL) 1.1 in Quadro FX4600, FX5600 FX, and Quadro x700 series and newer GPUs.
- OpenGL 4.4
- DirectX 11
- CUDA 6.0

What's New in Release 331

The section summarizes the following driver changes in Release 331 since Release 319:

ODE Driver

This is the sixth 'Optimal Drivers for Enterprise'(ODE) branch release. ODE branches are dedicated to relatively long term stability for ISV certification, OEMs, and Enterprise customers.

OS Support

- This is the first ODE driver to support Windows 8.1
- Support for Windows XP is discontinued starting with this release.

OpenGL

- Added support for OpenGL 4.4

CUDA

- Added support for CUDA 6.0

Workstation Features

Mosaic

- Improved Mosaic setup time.
- Added default topology and display numbering in the NVIDIA Control Panel->Mosaic setup process.

NvWMI

Updated to version 2.15.

- Added support for creating multiple display grids.
- Added support for passive stereo modes.

NvAPI

- **Viewport Scanout with Warp and Blend**: Added support via NVAPI for viewport scanout with warp and blend. The warp NVAPI interface supports viewport scanout on custom resolutions.

NVIDIA Control Panel

- **Workstation->EDID Management**

  Added controls to improve productivity by providing a way to force an EDID on multiple connectors at a time, instead of one at a time.

- **Display->Change Resolution**

  Added controls to import or export customs resolutions. Allows users to create a custom resolution and then export it to a file which can be imported for recreating the same set of custom resolutions on the same system or across systems.

What's New in Version 332.50

- This driver offers performance improvements over previous driver versions, including workstation compatibility fixes.
- This driver installs **nView Desktop Manager** version 141.00.
- See "Changes in Version 332.50" on page 13 for a list of changes and resolved issues in this driver version.

Discontinued and Unsupported Features in this Release

Discontinued Features

- The NVIDIA® AutoCAD Performance driver is no longer integrated in the graphics driver.

  Standalone versions or version updates can still be downloaded from the NVIDIA driver download page.
- The following features are removed from the NVIDIA Control Panel
  - The Views option

    You no longer need to select between Standard and Advanced views for many NVIDIA Control Panel controls.
  - The Profiles menu
- Support for Quadro SDI products is discontinued for Windows 8 and later operating systems.
- Legacy Support for Curie generation of Workstation products

  Beginning with Release 310, the NVIDIA professional drivers no longer support the Curie generation of Workstation products.

NVIDIA Quadro FX 5500
NVIDIA Quadro FX 4500 X2
NVIDIA Quadro FX 4500
NVIDIA Quadro FX 4400
NVIDIA Quadro FX 4400G
NVIDIA Quadro FX 4000
NVIDIA Quadro FX 470
NVIDIA Quadro FX 350
NVIDIA Quadro VX 200
NVIDIA Quadro NVS 440
NVIDIA Quadro NVS 285

Release 304 drivers continue to support Curie generation Workstation products, and NVIDIA will continue to address driver issues for these products in driver branches up to and including Release 304. However, future driver enhancements and optimizations in driver releases after Release 304 will not support Curie generation products.

Limitations in This Release

The following are features that are not currently supported or have limited support in this driver release:

- **Video Memory Support**

  For Windows 7 and Windows Vista 64-bit, this driver recognizes up to the total available video memory on Quadro cards for Direct3D and OpenGL applications.

  For Windows 7 and Windows Vista 32-bit, this driver recognizes only up to 4 GB of video memory on Quadro cards for DirectX, OpenGL, and CUDA applications.

- **NVIDIA Control Panel Display Category**

  - The Graph tab on the Adjust Desktop Color Settings page is not available.

Advanced Instructions for this Release

This section clarifies instructions for successfully accomplishing the following tasks:

- Turning Off V-Sync to Boost Performance
- NVIDIA Application Configuration Engine (ACE)
- Using the WDDM Driver Model with Tesla GPU GOMs
- SLI Multi-OS – GPU Assignment in System Virtualization

Turning Off V-Sync to Boost Performance

To get the best benchmark and application performance measurements, turn V-Sync off as follows:

1. Open the NVIDIA Control Panel and make sure that *Advanced Settings* is selected from the control panel tool bar.
2. From the *Select a Task* pane, under 3D Settings, click **Manage 3D Settings**, then click the Global Settings tab.
3. From the Global presets pull-down menu, select **Base profile.**
4. From the Settings list box, select **Vertical sync** and change its value to **Force off**, then click **Apply**.
5. From the Global presets pull-down menu, select **3D App - Default Global Settings** (the driver's default profile) or use the application profile that matches the application you are testing, then click **Apply**.

Be sure to close the NVIDIA Control Panel completely —leaving it open will affect benchmark and application performance.

NVIDIA Application Configuration Engine (ACE)

This driver includes the NVIDIA Application Configuration Engine (ACE), which automatically detects the workstation application and configures the appropriate profile settings in the NVIDIA Control Panel.

See the *NVIDIA Quadro Professional Drivers: NVIDIA Control Panel Quick Start Guide* for more information about this feature.

Using the WDDM Driver Model with Tesla GPU GOMs

Tesla GPU Operation Modes

Tesla K20X and K20 GPU Accelerators offer the ability to specify the GPU operation mode using NV-SMI/NVML. (refer to: https://developer.nvidia.com/nvidia-management-library-nvml).

By setting the GPU operation mode, developers can selectively turn off certain features in the GPU to get the best performance per watt for certain workloads.

The following are the supported GOMs:

- **Compute-Only**: For running compute tasks only.

  By default the Tesla K20X and K20 accelerator boards ship in this mode.

- **Low-Double Precision**: For graphics applications that don't require high bandwidth double precision.

  This is recommended for workloads that are not sensitive to double precision but at the same time need graphics capabilities.

- **All On**: This is recommended only when the workload needs full double precision as well as graphics capabilities.

WDDM and TCC Driver Models

Along with the GPU operation mode, the developer needs to select the compatible driver model for the Tesla K20X and K20.

- Tesla Compute Cluster **(TCC)**: Optimized for running compute workloads.
- Windows Device Driver Model **(WDDM)**: Designed for graphics application and not recommended for compute workloads.

Compatibility Between GOM and Driver Models

Table 1 shows which GPU operation modes are compatible with which driver models.

Table 1 GOM and Driver Model Compatibility

GOM	TCC Driver Model	WDDM Driver Model	Use Case Support
All On	YES	YES	All use cases are supported.
Compute-Only	YES	NO	The following are **unsupported**: X11 and those that require X11 (GLInterop, OCL conformance and VIPER) 32-bit Windows OS
Low Double Precision	YES	YES	All use cases supported.

The compute-only GOM is supported only on the TCC driver model, while the WDDM driver model supports only GOM modes that enable graphics.

The compute-only GOM and WDDM are incompatible and should not be used simultaneously.

The Tesla K20 Active Accelerators for workstations ship in "compute-only" mode and cannot be modified. Therefore, use only the TCC driver model with these products.

Using the WDDM Driver Model

To use the WDDM driver model with Tesla K20x and K20 GPU Accelerators for servers, first switch the GOM mode from compute-only to All On, then switch from TCC to WDDM.

Do not attempt to specify the driver model by editing the registry. Doing so can result in compute-only GOM and WDDM being configured simultaneously, which might require a clean installation of the driver to fix.

Always use NVIDIA-provided tools to specify a processing mode or to switch between driver models. Such tools include nvidia-smi or the NVIDIA Control Panel->Manage Maximus Settings page. These tools provide warnings in the case of a conflict.

SLI Multi-OS – GPU Assignment in System Virtualization

On systems with two or more graphics cards installed, this driver supports a hypervisor's ability to directly assign GPUs to guest virtual machines (VMs). This direct assignment allows each guest VM to run on their own operating system with their own GPU and driver. The assignment allows full GPU performance and functionality in the guest VM.

Hardware Platform Requirements

To make use of GPU passthrough with virtual machines running Windows and Linux, the hardware platform must support the following features:

- A CPU with hardware-assisted instruction set virtualization: Intel VT-x or AMD-V.
- Platform support for I/O DMA remapping.

  On Intel platforms the DMA remapper technology is called Intel VT-d.

  On AMD platforms it is called AMD IOMMU.

Support for these feature varies by processor family, product, and system, and should be verified at the manufacturer's website.

Supported Hypervisors

The following hypervisors are supported:

Hypervisor	Notes
Citrix XenServer	Version 6.0 and later.
VMware vSphere (ESX / ESXi)	Version 5.1 and later.
Parallels Workstation Extreme	Version 4 and later

Supported Graphics Cards

The following GPUs are supported for device passthrough:

GPU Family	Boards supported
Kepler	GRID: K1, K2, K520, K340 Quadro: K2000, K4000, K5000, K6000 Tesla: K10, K20, K20x, K20Xm, K20c, K20s, K40m, K40c, K40s, K40st, K40t
Fermi	Quadro: 2000, 4000, 5000, 6000 Quadro-MXM: 1000M, 3000M Tesla: C2050, C2075, M2050, M2070, M2070Q

GPU Family	Boards supported
Tesla	Quadro FX1800, 3800, 4800, 5800 Quadro-MXM: FX880M, FX2800M Tesla: M1060, C1060

Notes and Known Issues

VMware

- PCI I/O hole may need to be changed for Windows 64-bit VMs.

  Windows 64-bit VMs may require that you edit the VM configuration file to configure a larger PCI I/O hole for the GPU.

- Access Control Services is required on some switches.

  Starting with ESX 5.0 Update 1, Access Control Services (ACS) is required on any switches in the PCIe hierarchy above a PCIe device that is to be used for passthrough. If ACS is not present, ESX will not allow the device to be assigned directly to a VM.

  To allow assignment of devices below switches that do not support ACS, you can disable the ACS check as follows:

  esxcfg-advcfg -k true disableACSCheck

- Configuring passthrough to a Windows Server 2008R2 VM.

  The VMware WDDM driver must be manually installed on Windows Server 2008 R2.

  Follow the steps provided at http://communities.vmware.com/message/1423263#1425288 .

- MSI translation must be disabled.

  Blue-screen crashes may occur on VMs with assigned GPUs if MSI is initially enabled for passthrough devices.

  To avoid this issue, disable MSI translation by setting *pciPassthru0.msiEnabled = "FALSE"* in the VM's VMX file.

Citrix Xenserver

- XenServer 6.1 workaround for 64-bit MMIO failures on PCI passthrough.

  Dom0 kernel may relocate GPU BARs to an invalid location immediately beyond the end of physical RAM. There are two workaround options to address this condition:

  Workaround option #1: Add 'pci=use_crs' to the kernel parameters by running the following command in Dom0:

  /opt/xensource/libexec/xen-cmdline --set-dom0 pci=use_crs

Workaround option #2: Install the hotfix provided by Citrix at http://support.citrix.com/article/CTX137645):

Multi-Monitor Support on GRID

Multi-monitor support on GRID boards K1 and K2 requires the following VBIOS versions:

- GRID K1: ***80.07.AF.00.00*** *or later*
- GRID K2: ***80:04:BA:00.00*** *or later*

Changes in Version 332.50

The following sections list the important changes and the most common issues resolved since driver version 332.21.

Windows Vista/Windows 7/Windows 8 Fixed Issues

- [Tesla K20c][Matlab]: The Telsa K20c does not perform as well as the Tesla C2050 for high-aspect DGEMM.

  Fixed with CUDA 6.0.

Changes in Version 332.21

The following sections list the important changes and the most common issues resolved since driver version 331.65.

Windows Vista/Windows 7/Windows 8 Fixed Issues

- [Visi]: Dialog boxes may become unusable, requiring application restart from Task Manager.
- [nView][Catia V5-6R2014]: The application may crash during the file-save process.

  This issue is fixed with nView Desktop Manager version 140.94.
- [Quadro K5000]: When connected using the HDMI connection, the ASUS 4K panel cannot be selected from the NVIDIA Control Panel->Set Up Multiple Displays page.

Changes in Version 331.82

The following sections list the important changes and the most common issues resolved since driver version 331.65.

Windows Vista/Windows 7/Windows 8 Fixed Issues

- [Quadro 4000][Maya]: The application crashes if the NVIDIA driver intercepts memory allocation calls on Windows.
- [ESI]: Added unique profile.

Changes in Version 331.65

The following sections list the important changes and the most common issues resolved since driver version 320.92.

Windows Vista/Windows 7/Windows 8 Fixed Issues

- [NX 8.5]: The application crashes when performing Assemblies Constraint operations with Threaded optimization turned ON. [
- [Cinema 4D]: Performance improvements are requested.
- [Cinema 4D]: Threaded optimization causes the application to respond slowly.
- [Vegas Pro 12]: The driver crashes in nvoglv64.DLL ("NVIDIA Compatible OpenGL ICD").
- [AVID Motion Graphics]: The application performance has dropped since driver version 307.32.
- [NVIDIA Nsight]: The application crashes when launched.
- [Mantis][Quadro 6000][G-Sync]: The application locks up in SwapBuffers() when using G-Sync.
- [Quadro 6000]: clCreateFromGLTexture2D fails with Mipmaps.
- Quadro 6000: GLSL break statement is broken.
- [Quadro 6000/K600]: The driver crashes in clCreateFromGLBuffer when many instructions are in the pipeline and graphics memory use is high.
- [Quadro 4000]: Sampler uniforms do not retain their values.
- [Quadro 2000]: Memory usage is increased.
- [Quadro 2000][Catia]: When repeatedly zooming in and out a model, the application becomes unresponsive and a driver “lost connection” error occurs.
- [Quadro 600]: The primary display automatically switches to a second DVI display once the new display is connected.
- [Quadro FX 4800/5800][CUDA]: With CUDA enabled, SD files appear corrupt when played on an HD timeline. [
- [Quadro FX 3800/4800]: There is a 3x performance drop after driver version 275.89.
- [Quadro FX 1700]: There is a 10x performance drop after driver version 275.89.
- [Quadro FX 1800M]: The clCreateContext operation fails.

Open Issues in Version 332.50

As with every released driver, version 332.50 of the Release 331 driver has open issues and enhancement requests associated with it. This section includes lists of issues that are either not fixed or not implemented in this version. Some problems listed may not have been thoroughly investigated and, in fact, may not be NVIDIA issues. Others may have workaround solutions.

- "Windows Vista/Windows 7 32-bit Issues" on page 17
- "Windows Vista/Windows 7 64-bit Issues" on page 17

Windows Vista/Windows 7 32-bit Issues

- [Quadro FX1500]: Blue-screen crash occurs after installing the DisplayLink driver.

Windows Vista/Windows 7 64-bit Issues

- [Eyeon Fusion]: With Aero/desktop compositing and Quad-buffer stereo enabled, the application child windows flicker.
- [Quadro K5000][Quadro Sync][Touch Designer with Video Editing Profile]: Blue-screen crash occurs.
- [Kepler-class GPUs]: 10-bit support doesn't work if a 10-bit capable monitor is connected to DVI when the computer boots, and then later transferred to the DisplayPort connector.
- [Quadro Plex 7000][G Sync]: With a projector cluster setup where each projector is driven by one GPU, p-state transitions cause one of the channels to go blank.
- [Quadro 6000][Quadro G-Sync]: Edges may lose their sharpness with framelock enabled.
- [Quadro 6000][Quadro G-Sync]: The driver does not allow setting only one sync-slave display.
- Quadro 6000/5000: clCreateFromGLBuffer returns CL_OUT_OF_HOST_MEMORY.
- [Quadro 4000/K5000]: Rendering fails with GL_INVALID_OPERATION error in the draw call.

Windows 8 64-bit Issues

- [3D Stereo]: There is no stereo+overlay pixel format support for Windows 8.

Not NVIDIA Issues

This section lists issues that are not due to the NVIDIA driver as well as features that are not meant to be supported by the NVIDIA driver for Windows Vista/Windows 7.

- "Windows Vista Considerations" on page 18
- "Windows 7 Considerations" on page 18
- "Unsupported Features" on page 19
- "OpenGL Application Issues" on page 21
- "OpenGL Application Issues" on page 21
- "Application Issues" on page 21
- "Other Issues" on page 22

Windows Vista Considerations

These are behaviors that may be different from Windows XP and are related directly to the Windows Vista operating system.

- **Gamma ramps are inconsistent between single and two-headed systems.**
- **NVIDIA TurboCache**

  Windows Vista now controls the allocation of system memory to the GPU for TurboCache functions. The Windows Vista Display Properties pages show the shared system memory (SSM), or how much memory is allocated for NVIDIA GPUs to use for TurboCache.

  For more information on graphics memory reporting under Windows Vista, visit http://www.microsoft.com/whdc/device/display/graphicsmemory.mspx.

Windows 7 Considerations

Windows DWM Disabled for SLI Mosaic Mode

Due to compatibility issues, when using SLI Mosaic mode the driver turns off the Windows 7 Desktop Window Manager (DWM). As a result, DWM-managed desktop features such as Windows Aero or Windows Flip 3D will not be available.

Hotplug Action

Unlike the hotplug activity under Windows Vista, the default settings are not applied when a new display is hotplugged, and there is no message balloon alert stating that a new display was detected. Under Windows 7, all display connection and detection events are handled through the Windows 7 Connecting and Configuring Displays (CCD) mechanism.

NVIDIA Control Panel Rotate Display Page

The rotation radio button labels are changed slightly under Windows 7 to be consistent with the Microsoft panel

Table 2.1 NVIDIA Control Panel Rotation Page Radio Buttons

Clockwise Rotation	Windows 7 Label	Windows Vista Label
0 degrees	Landscape	No rotation (Landscape)
90 degrees	Portrait	90 degrees to the right (Inverted Portrait)
180 degrees	Landscape (flipped)	180 degree rotation (Inverted landscape)
270 degrees	Portrait (flipped)	90 degrees to the left (Portrait)

Limitation

- When switching the refresh rate from 59 Hz to 60Hz, the refresh rate remains at 59 Hz.

  See the Microsoft KB article KB2006076 at http://support.microsoft.com/kb/2006076.

Unsupported Features

The following are features and functionality that were available in driver releases supporting Windows XP, but are not–and will not be–available in driver releases for Windows Vista:

- **High resolution scaling desktop (HRSD)**
- **MultiView Display Mode** (for NVIDIA Quadro NVS graphics cards)
- **NVKeystone**
- **Unified back buffer (UBB) controls**
- **OpenGL Video Overlays**

  This is an operating system limitation.
- **Overclocking**

  GPU overclocking is no longer supported in the default GPU driver control panel. This feature is available in the NVIDIA System Tools software, which you can download from NVIDIA.com.
- **GPU Temperature Monitoring**

  Temperature monitoring is no longer supported in the default GPU driver control panel. This feature is available in the NVIDIA System Tools software, which you can download from NVIDIA.com.
- **AGP Settings Adjustment**

- **Video Zoom**
- **Pan & Scan** - the process of panning across the desktop in order to display a desktop on a monitor with lower resolution
- **Per-display Desktop Color Setting Adjustments**

  For Clone mode, the desktop color setting adjustments through the NVIDIA Control Panel can only be made across all displays in a system, and not on a per-display basis.
- **Per-display Video Color Setting Adjustments**

  For Dualview mode, the video color setting adjustments through the NVIDIA Control Panel can only be made across all displays in a system, and not on a per-display basis.
- **Edge Blending**
- **Run display optimization wizard**
- **Run multiple display wizard**
- **Run television setup wizard**
- **nView Horizontal and Vertical Span Modes**

  Due to architectural changes in the new Windows Vista Window Display Driver Model (WDDM), span mode is available only with NVIDIA Mosaic Technology.
- **Display/Connection Wizard** (such as was provided with Windows Media Center Edition)
- **DVD/MPEG Extensions** (such as was provided with Windows Media Center Edition)
- **Audio Extensions** (such as was provided with Windows Media Center Edition)

OpenGL Application Issues

The following are known compatibility issues for OpenGL applications developed under Windows XP:

- Mixed GDI and OpenGL rendering does not work.

  A number of applications use GDI to render UI components and object highlighting. This is not supported in the Windows Vista driver model.

  NVIDIA recommends converting GDI rendering to OpenGL.

  The following are some applications that are known to have this issue:

  - Maya 7.01

- Applications, Tools, and Benchmarks not Supported Under Windows Vista
  - GLperf
  - 3ds max 8 (later releases may be supported)
  - CATIA V5R15 (V5R16 is supported)
  - PTC's CDRS 2001

- Front buffered rendering may be slow, especially when DWM is enabled.

  Flushing the rendering queue while rendering to the front buffer may cause the window manager to recomposite. Applications should therefore minimize the frequency with which they flush the rendering queue.

Application Issues

- Softimage–The application crashes when thumbing the CgFX scene model while in wireframe display mode.
- Solidworks 2009–Application profile is not shown in the NVIDIA Control Panel when SolidWorks 2009 is installed.

  This is an issue with the application shortcut.

- ArchiCAD–the driver crashes when navigating 3D shadows.
- ArchiCAD12–OpenGL speed is half as fast on Windows Vista than on Windows XP.
- CATIA V5R20–not all drawing elements appear if the drawing is created using Approximate mode.

Other Issues

- Quadro 6000: OpenCL/OpenGL interoperability performance suffers with clEnqueueReleaseGLObjects.

  To avoid this issues, use CUDA.

- The Windows Vista display mode switches from Aeroglass to Basic when a quad-buffer for stereo is created.

  Quad-buffered windowed stereo is only supported with Aeroglass turned off.

- The NVIDIA Control Panel->Set Up Multiple Displays page does not provide the capability of setting the dual monitor order under Windows Vista as it does under Windows XP.

  This capability is provided through the Windows Vista Display Properties Settings page.

Known Product Limitations

This section describes problems that will not be fixed. Usually, the source of the problem is beyond the control of NVIDIA. Following is the list of problems and where they are discussed in this document:

- "System Should not Enter Sleep/Hibernate Mode With SDI Capture in Progress" on page 23
- "Once Installed, the SDI Capture Driver Release Must Always Match the Graphics Driver" on page 24
- "Some APIs do not Report Total Available Graphics Memory Correctly" on page 24
- "Using HDMI/DisplayPort Audio with Displays that have a High Native Resolution" on page 26
- "Using HDMI/DisplayPort Displays that do not Support Audio" on page 26
- "Using HDMI/DisplayPort Audio in Dualview or Clone Mode Configurations" on page 27
- "GPU Runs at a High Performance Level (full clock speeds) in Multi-display Modes" on page 27
- "Aero Must be Enabled for Windowed SLI AFR Mode Under Vista" on page 27
- "SLI Connector Requirement on NVIDIA Quadro SLI Cards" on page 28
- "Applying Workstation Application Profiles" on page 28
- "1280x1024 @ 60 Hz not Available on BenQ FP241W Monitors" on page 28
- "Gigabyte GA-6BX Motherboard" on page 28

System Should not Enter Sleep/Hibernate Mode With SDI Capture in Progress

SDI capture programs will become non-responsive upon resume from sleep or hibernate modes.

This is not a typical use case, so power management tests should not be performed when testing SDI.

Once Installed, the SDI Capture Driver Release Must Always Match the Graphics Driver

To use the Quadro SDI Capture card, you need to install the NVIDIA WDM driver for the Quadro SDI Capture card after installing the Quadro professional driver. The WDM driver version must be from the same branch as the installed NVIDIA graphics driver.

If at a later time you install a different Quadro professional driver version–for example, when upgrading from a Release 260 driver to a Release 265 driver–you must reinstall the WDM driver from the same driver branch as well– in this example, Release 265.

You must install the updated WDM driver even if remove the SDI Capture card and uninstall the WDM driver. Portions of the old WDM driver remain on the system, and the resulting mismatch with the updated graphics driver results in a faulty driver installation. Installing a matching WDM driver corrects this issue.

Some APIs do not Report Total Available Graphics Memory Correctly

Background–TAG Memory

In the Windows Display Driver Model (WDDM), Total Available Graphics (TAG) memory is reported as the sum of

- Dedicated Video Memory (video memory dedicated for graphics use)
- Dedicated System Memory (system memory dedicated for graphics use), and
- Shared System Memory (system memory shared between the graphics subsystem and the CPU).

The values for each of these components are computed according to WDDM guidelines when the NVIDIA Display Driver is loaded.

Issue

NVIDIA has found that some TAG-reporting APIs represent video memory using 32-bits instead of 64-bits, and consequently do not properly report available graphics memory when the TAG would otherwise exceed 4 gigabytes (GB). This results in under reporting of available memory and potentially undesirable behavior of applications that rely on these APIs to report available memory.

The reported memory can be severely reduced. For example, 6 GB might be reported as 454 MB, and 8 GB might be reported as 1259 MB.

NVIDIA Action for Some GeForce-based Systems

For GeForce GPUs with 2.75 GB or less of video memory, the NVIDIA display driver constrains TAG memory to just below 4 GB[1]. In this scenario, the Shared System Memory component of TAG is limited first, before limiting Dedicated Video Memory.

This is a policy decision within the driver, and results in reliable reporting of sub-4 GB TAG memory.

When TAG Reporting Would Not Be Limited

For GeForce-based GPUs with more than 2.75 GB of video memory, as well as all Quadro and Tesla GPUs, the NVIDIA display driver does not constrain TAG memory reporting.

The disadvantage of constraining TAG on systems with larger amounts of video and system memory is that memory which otherwise would be available for graphics use is no longer available. Since shared system memory is limited first, driver components and algorithms utilizing shared system memory may suffer performance degradation when TAG is constrained.

Since these and similar scenarios are prevalent in many Workstation applications, the NVIDIA driver avoids constraining TAG on all Quadro and Tesla-based systems. Likewise, the driver does not constrain TAG for GeForce-based systems with more than 2.75 GB of video memory.

1. The WDDM guidelines dictate minimum and maximum values for the components, but the display driver may further constrain the values that are reported (within the allowed minimum and maximum).

Using HDMI/DisplayPort Audio with Displays that have a High Native Resolution

To use HDMI/DisplayPort audio with some displays that have a native resolution higher than 1920x1080, you must set the display to a lower HD resolution.

Some HDMI TV's have a native resolution that exceeds the maximum supported HD mode. For example, TVs with a native resolution of 1920x1200 exceed the maximum supported HD mode of 1920x1080.

Applying this native mode results in display overscan which cannot be resized using the NVIDIA Control Panel since the mode is not an HD mode.

To avoid this situation and provide a better user experience, the driver treats certain TVs– such as the Viewsonic VX2835wm and the Westinghouse LVM- 37w3–as a DVI monitor when applying the native mode. Because the driver does not treat the TV as an HDMI in this case, the HDMI audio is not used.

Using HDMI/DisplayPort Displays that do not Support Audio

Some HDMI/DisplayPort displays do not support audio, or have issues with Quadro FX family and earlier NVIDIA graphics cards.

The NVIDIA driver attempts to identify such displays and automatically disables the audio. For example, the NVIDIA driver disables HMDI audio for all Philips HDMI TVs, as these have been identified as having issues with Quadro FX family and earlier NVIDIA graphics cards.

There may be cases where either the driver disables audio even though there is no problem, or does not disable the audio when in fact the audio does not work. The following sections describe these situations and provides guidance for handling them.

Corrupted video and no audio

The driver has not disabled audio and the display's audio signal is incompatible with the graphics card, causing video corruption.

With a different display connected in order to establish video, disable audio for the HDMI display using the NVIDIA Control Panel-> Change Resolution page. From the connector list, select **HDMI-HDTV (Audio Disabled)**.

Video but no audio

- Check the connector list on the NVIDIA Control Panel->Change Resolution page.
- If **HDMI-HDTV (Audio Disabled)** is selected and you want to test whether your HDMI audio does, in fact, work, then select **HDMI-HDTV (Audio Enabled)** and the driver will prompt you with instructions for testing HDMI audio with the display.
- If **HDMI-HDTV (Audio Enabled)** is selected, then the driver has not successfully detected that an incompatible display is connected.

  Future drive versions will properly identify such displays and disable audio.
- If there is no HDMI connector option in the NVIDIA Control Panel->Change Resolution page, the display does not support audio and has properly reported this to the NVIDIA driver.

Using HDMI/DisplayPort Audio in Dualview or Clone Mode Configurations

Two Audio-enabled Ports

In a multi-display configuration where both HDMI/DisplayPort audio ports are enabled, only the primary display will provide the audio.

One Audio-enabled Port

In a multi-display configuration where only one audio port is enabled, such as when one display is a DVI display, then the HDMI/DisplayPort display can provide the audio whether is it the primary or secondary display.

GPU Runs at a High Performance Level (full clock speeds) in Multi-display Modes

This is a hardware limitation and not a software bug. Even when no 3D programs are running, the driver will operate the GPU at a high performance level in order to efficiently drive multiple displays. In the case of SLI or multi-GPU PCs, the second GPU will always operate with full clock speeds; again, in order to efficiently drive multiple displays. Today, all hardware from all GPU vendors have this limitation.

Aero Must be Enabled for Windowed SLI AFR Mode Under Vista

Windows 7 Aero must be enabled in order to achieve SLI acceleration using windowed AFR mode.

SLI Connector Requirement on NVIDIA Quadro SLI Cards

The SLI connector that links two SLI cards is needed for proper SLI operation. However, the connector can be removed if you do not intend to enable SLI mode. If you remove the connector, then you must make sure that SLI mode is disabled from the NVIDIA control panel. Enabling SLI mode without the SLI connector installed will result in video corruption.

Applying Workstation Application Profiles

- **Background**

  The workstation application profiles are software settings used by the NVIDIA Display Drivers to provide optimum performance when using a selected application. The profile also works around known application issues and bugs.

  If there is an available setting for an application, it should be used, otherwise incorrect behavior or reduced performance is likely to occur.

- **Issues**

  Configuration changes require that you restart the application.

  Once an application is running, it does not receive notification of configuration changes, Therefore, if you change the configuration while the application is running, you must exit and restart the application for the configuration changes to take effect.

1280x1024 @ 60 Hz not Available on BenQ FP241W Monitors

Even though the monitor EDID lists 1280x1024 @ 60 Hz, the screen turns blank when using an HDMI connection. This is an issue with the monitor and not the NVIDIA driver.

Because of this issue with the monitor, the NVIDIA driver blocks the problem mode (1280x1024 @ 60 Hz) and makes it unavailable.

Gigabyte GA-6BX Motherboard

This motherboard uses a LinFinity regulator on the 3.3-V rail that is rated to only 5 A—less than the AGP specification, which requires 6 A. When diagnostics or applications are running, the temperature of the regulator rises, causing the voltage to the NVIDIA chip to drop as low as 2.2 V. Under these circumstances, the regulator cannot supply the current on the 3.3-V rail that the NVIDIA chip requires.

This problem does not occur when the graphics board has a switching regulator or when an external power supply is connected to the 3.3-V rail.

03 THE RELEASE 331 DRIVER

This chapter covers the following main topics:

- "Hardware and Software Support" on page 29
- "Driver Installation" on page 37

Hardware and Software Support

Supported Operating Systems

The Release 331 driver, version 332.50, has been tested with

- Microsoft Windows® 8.1, and supports both 32-bit and 64-bit versions.
- Microsoft Windows® 8, and supports both 32-bit and 64-bit versions.
- Microsoft Windows® 7, and supports both 32-bit and 64-bit versions.
- Microsoft Windows® Vista, and supports both 32-bit and 64-bit versions.

Supported NVIDIA Products

The following tables list the NVIDIA products supported by the Release 331 driver, version 332.50.

- Table 3.1, "Supported NVIDIA Quadro & NVS Products" on page 30
- Table 3.2, "Supported NVIDIA Quadro Sync Products" on page 32
- Table 3.3, "Supported NVIDIA Quadro G-Sync II Products" on page 32
- Table 3.4, "Supported NVIDIA Quadro SDI Products" on page 32
- Table 3.5, "Supported NVIDIA Quadro Plex Products" on page 33
- Table 3.6, "Supported NVIDIA Quadro Blade/Embedded Graphics Board Series" on page 33
- Table 3.7, "Supported NVIDIA Tesla Products" on page 34
- Table 3.8, "Supported NVIDIA GRID Products" on page 34

NVIDIA Quadro & NVS Product

Table 3.1 Supported NVIDIA Quadro & NVS Products

Product	Notes
NVIDIA Quadro K6000	
NVIDIA Quadro K5000	
NVIDIA Quadro K4000	
NVIDIA Quadro K2000	
NVIDIA Quadro K600	
NVIDIA Quadro 6000	
NVIDIA Quadro 5000	
NVIDIA Quadro 4000	
NVIDIA Quadro 2000D	
NVIDIA Quadro 2000	
NVIDIA Quadro 600	
NVIDIA Quadro 410	
NVIDIA Quadro 400	
NVIDIA Quadro FX 5800	
NVIDIA Quadro FX 5600	
NVIDIA Quadro FX 4800	
NVIDIA Quadro FX 4700 X2	
NVIDIA Quadro FX 4600	
NVIDIA Quadro FX 3800	
NVIDIA Quadro FX 3700	

Table 3.1 Supported NVIDIA Quadro & NVS Products (continued)

Product	Notes
NVIDIA Quadro FX 3450	
NVIDIA Quadro FX 1800	
NVIDIA Quadro FX 580	
NVIDIA Quadro FX 570	
NVIDIA Quadro FX 380	
NVIDIA Quadro FX 380 LP (low profile)	
NVIDIA Quadro FX 370	
NVIDIA Quadro FX 370 LP (low profile)	
NVIDIA Quadro CX	
NVIDIA NVS 510	
NVIDIA NVS 310	
NVIDIA NVS 300	
NVIDIA Quadro NVS 450	
NVIDIA Quadro NVS 420	
NVIDIA Quadro NVS 295	
NVIDIA Quadro NVS 290	

NVIDIA Quadro Sync Products

Table 3.2 Supported NVIDIA Quadro Sync Products

Product	Notes
NVIDIA Quadro K6000	
NVIDIA Quadro K5000	

NVIDIA Quadro G-Sync II Products

Table 3.3 Supported NVIDIA Quadro G-Sync II Products

Product	Notes
NVIDIA Quadro 6000	
NVIDIA Quadro 5000	
NVIDIA Quadro FX 5800	
NVIDIA Quadro FX 4800	
NVIDIA Quadro FX 5600	
NVIDIA Quadro FX 4600	

NVIDIA Quadro SDI Products

Table 3.4 Supported NVIDIA Quadro SDI Products

Product	Notes
NVIDIA Quadro 6000 SDI	
NVIDIA Quadro 5000 SDI	
NVIDIA Quadro 4000 SDI	
NVIDIA Quadro FX 5800 SDI	
NVIDIA Quadro CX SDI	
NVIDIA Quadro FX 5600 SDI	
NVIDIA Quadro FX 4800 SDI	
NVIDIA Quadro FX 4600 SDI	
NVIDIA Quadro FX 3800 SDI	

Note: Quadro SDI products are not supported under Windows 8.

NVIDIA Quadro Plex Products

Table 3.5 Supported NVIDIA Quadro Plex Products

Product	Notes
NVIDIA Quadro Plex 7000	
NVIDIA Quadro Plex D Series	
NVIDIA Quadro Plex S Series	
NVIDIA Quadro Plex Model IV	

NVIDIA Quadro Blade/Embedded Graphics Board

Table 3.6 Supported NVIDIA Quadro Blade/Embedded Graphics Board Series

Product	Notes
NVIDIA Quadro K5000M	
NVIDIA Quadro K4000M	
NVIDIA Quadro K3000M	
NVIDIA Quadro 4000M	
NVIDIA Quadro 3000M	
NVIDIA Quadro 1000M	
NVIDIA Quadro 500M	
NVIDIA Quadro FX 3600M	
NVIDIA Quadro FX 2800M	
NVIDIA Quadro FX 880M	
NVIDIA Quadro FX 770M	
NVIDIA Quadro FX 370M	

NVIDIA Tesla Products

The Tesla driver package is designed for systems that have one or more Tesla products installed.

- Only one GHIC can be connected to the server in a Tesla system.
- This release of the Tesla driver supports CUDA C/C++ applications and libraries that rely on the CUDA C Runtime and/or CUDA Driver API.

Table 3.7 Supported NVIDIA Tesla Products

Product	Notes
Tesla K-Series Products	
NVIDIA Tesla K40(m/c/s/st/t)	64-bit OS only
NVIDIA Tesla K20(x/c/m/Xm/s)	64-bit OS only
NVIDIA Tesla K10	
Tesla S-Class Products	
NVIDIA Tesla S2050	
NVIDIA Tesla S1070	
Tesla M-Class Products	
NVIDIA Tesla M2090	
NVIDIA Tesla M2075	
NVIDIA Tesla M2070	
NVIDIA Tesla M2070Q	
NVIDIA Tesla M2050	
NVIDIA Tesla M1060	
Tesla C-Class Products	
NVIDIA Tesla C2075	
NVIDIA Tesla C2070	
NVIDIA Tesla C2050	
NVIDIA Tesla C1060	
NVIDIA Tesla C870	

NVIDIA GRID Products

Table 3.8 Supported NVIDIA GRID Products

Product	Notes
NVIDIA GRID K2	Windows 7 Windows 8

Table 3.8 Supported NVIDIA GRID Products (continued)

Product	Notes
NVIDIA GRID K1	Windows 7 Windows 8

Supported Languages

The Release 331 Graphics Drivers supports the following languages in the main driver Control Panel:

English (USA)	German	Portuguese (Euro/ Iberian)
English (UK)	Greek	Russian
Arabic	Hebrew	Slovak
Chinese (Simplified)	Hungarian	Slovenian
Chinese (Traditional)	Italian	Spanish
Czech	Japanese	Spanish (Latin America)
Danish	Korean	Swedish
Dutch	Norwegian	Thai
Finnish	Polish	Turkish
French	Portuguese (Brazil)	

Driver Installation

Minimum Hard Disk Space

The hard disk space requirement for 32-bit is minimum 220 MB for English-only, and 300 MB for International.

The hard disk space requirement for 64-bit is minimum 320 MB for English-only, and 400 MB for International.

Before You Begin

nTune

If you have previously installed NVIDIA nTune, NVIDIA recommends that you uninstall nTune before installing this driver. After the driver install is complete, you can reinstall NVIDIA nTune.

SLI Mosaic Mode

You must make sure SLI Mosaic mode is disabled before installing a new driver over a previously installed driver. If SLI Mosaic mode is active on your displays when you install the new driver, the driver will not install properly.

Installation Instructions

1. Follow the instructions on the NVIDIA .com Web site driver download page to locate the appropriate driver to download, based on your hardware and operating system.
2. Click the driver download link.

   The license agreement dialog box appears.
3. Click **Accept** if you accept the terms of the agreement, then either open the file or save the file to your PC and open it later.
4. Open the NVIDIA driver installation .EXE file to launch the NVIDIA InstallShield Wizard.
5. Follow the instructions in the NVIDIA InstallShield Wizard to complete the installation.

Note: If you are overinstalling the driver (installing over a previous driver without first removing the previous driver), then you must reboot your computer in order to complete the installation.

APPENDIX A MODE SUPPORT FOR WINDOWS

This chapter details the Windows modes supported by the Release 331 driver for NVIDIA products. It contains these sections:

- "General Mode Support Information" on page 39
- "Default Modes Supported by GPU" on page 40
- "Modes Supported by TV Encoders" on page 43

General Mode Support Information

The NVIDIA graphics driver includes a standard list of display modes that are supported by default. These modes are listed in the section "Default Modes Supported by GPU" on page 40.

The actual modes available depend on the capabilities of the display. In addition, the NVIDIA graphics driver has a "dynamic EDID detection" capability and will make available *additional* modes that are listed in the display EDID, provided the graphics hardware can support it.

The NVIDIA graphics driver also supports the high resolutions available with the displays listed in Table A.1 as well as the non-standard modes listed in Table A.2.

Table A.1 Modes Supported for High Resolution Displays

Display	Maximum Resolution
Apple 30" Cinema HD Display (Dual link DVI)	2560x1600 @ 60 Hz
Dell WFP 3007 (Dual Link DVI)	2560x1600 @ 60 Hz
HP LP3065 dual-link DVI flat panel	2560x1600 @ 60Hz.

Table A.2 Non-standard Modes Supported

Resolution		
1680 x 1050		
1366 x 768		

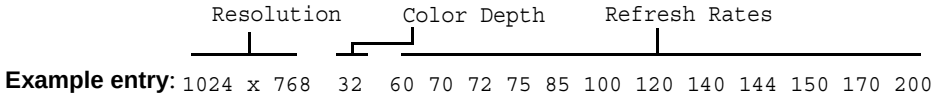
Default Modes Supported by GPU

This section lists the modes that are included by default in the driver INF for the following product families:

▶ "Tesla, Quadro, & NVS GPUs" on page 41

Understanding the Mode Format

Figure A.1 gives an example of how to read the mode information presented in this section.



Meaning:
Resolution: 1024 x 768
Color depth: 32 bpp
Refresh rates: 60 Hz, 70 Hz, 72 Hz, 75 Hz, 85 Hz, 100 Hz, 120 Hz, 140 Hz, 144 Hz, 150 Hz, 170 Hz, and 200 Hz

Figure A.1 Mode Format

Note:

- Horizontal spanning modes of 3840x1080 and above, and vertical spanning modes of 1920x2160 and above generally require at least 32 MB of video memory at 32 bpp.
- An "i" next to the refresh rate indicates an interlaced refresh rate.

Tesla, Quadro, & NVS GPUs

This sections lists the supported display resolutions, color depths, and refresh rates for the products listed in "Supported NVIDIA Products" on page 30.

Standard Modes

```
 640 x  480   8      60 70 72 75 85 100 120 140 144 150 170 200 240
 720 x  480   8      60
 720 x  576   8   50
 800 x  600   8      60 70 72 75 85 100 120 140 144 150 170 200 240
1024 x  768   8      60 70 72 75 85 100 120 140 144 150 170 200 240
1152 x  864   8      60 70 72 75 85 100 120 140 144 150 170 200
1280 x  720   8      60
1280 x  768   8      60 70 72 75 85 100 120 140 144 150 170
1280 x  800   8      60 70 72 75 85 100 120 140 144 150 170
1280 x  960   8      60 70 72 75 85 100 120 140 144 150 170
1280 x 1024   8      60 70 72 75 85 100 120 140 144 150 170
1360 x  768   8      60 70 72 75 85 100 120 140 144 150 170
1600 x  900   8      60 70 72 75 85 100 120 140 144 150
1600 x 1024   8      60 70 72 75 85 100 120
1600 x 1200   8      60 70 72 75 85 100 120
1680 x 1050   8      60
1920 x 1080   8      60
1920 x 1200   8      60 70 72 75 85 100
1920 x 1440   8      60 70 72 75 85
2048 x 1536   8      60
--------------------------------------------------------------------
 640 x  480  16      60 70 72 75 85 100 120 140 144 150 170 200 240
 720 x  480  16      60
 720 x  576  16   50
 800 x  600  16      60 70 72 75 85 100 120 140 144 150 170 200 240
1024 x  768  16      60 70 72 75 85 100 120 140 144 150 170 200 240
1152 x  864  16      60 70 72 75 85 100 120 140 144 150 170 200
1280 x  720  16      60
1280 x  768  16      60 70 72 75 85 100 120 140 144 150 170
1280 x  800  16      60 70 72 75 85 100 120 140 144 150 170
1280 x  960  16      60 70 72 75 85 100 120 140 144 150 170
1280 x 1024  16      60 70 72 75 85 100 120 140 144 150 170
1360 x  768  16      60 70 72 75 85 100 120 140 144 150 170
1600 x  900  16      60 70 72 75 85 100 120 140 144 150
1600 x 1024  16      60 70 72 75 85 100 120
1600 x 1200  16      60 70 72 75 85 100 120
1680 x 1050  16      60
1920 x 1080  16      60
1920 x 1200  16      60 70 72 75 85 100
```

```
1920 x 1440  16      60 70 72 75 85
2048 x 1536  16      60
----------------------------------------------------------------
 640 x  480  32      60 70 72 75 85 100 120 140 144 150 170 200 240
 720 x  480  32      60
 720 x  576  32   50
 800 x  600  32      60 70 72 75 85 100 120 140 144 150 170 200 240
1024 x  768  32      60 70 72 75 85 100 120 140 144 150 170 200 240
1152 x  864  32      60 70 72 75 85 100 120 140 144 150 170 200
1280 x  720  32      60
1280 x  768  32      60 70 72 75 85 100 120 140 144 150 170
1280 x  800  32      60 70 72 75 85 100 120 140 144 150 170
1280 x  960  32      60 70 72 75 85 100 120 140 144 150 170
1280 x 1024  32      60 70 72 75 85 100 120 140 144 150 170
1360 x  768  32      60 70 72 75 85 100 120 140 144 150 170
1600 x  900  32      60 70 72 75 85 100 120 140 144 150
1600 x 1024  32      60 70 72 75 85 100 120
1600 x 1200  32      60 70 72 75 85 100 120
1680 x 1050  32      60
1920 x 1080  32      60
1920 x 1200  32      60 70 72 75 85 100
1920 x 1440  32      60 70 72 75 85
2048 x 1536  32      60

----------------------------------------------------------------
```

Modes Supported by TV Encoders

Table A.3 and Table A.4 list the NTSC, PAL, and HDTV TV-Out modes supported by the NVIDIA driver.

Table A.3 Mode Support for S-Video and Composite Out

Resolution	Bit depth	Comments
320x200	8, 16, 32	DirectDraw mode; not selectable as a Windows desktop
320x240	8, 16, 32	DirectDraw mode; not selectable as a Windows desktop
640x400	8, 16, 32	DirectDraw mode; not selectable as a Windows desktop
640x480	8, 16, 32	
720x480	8, 16, 32	Overscans (for video)
720x576	8, 16, 32	Overscans (for video)
800x600	8, 16, 32	
1024x768	8, 16, 32	Conexant 25871 only

Table A.4 Mode Support for Component YPrPb Out and DVI Out

Resolution	Comments
480i (SDTV)	Supported on graphics boards with Conexant 875 or Philips 7108 TV encoders and compatible connectors, and compatible GeForce 8 Series and later GPUs.
480p (EDTV)	
720p (HDTV)	
1080i (HDTV)	
576i (PAL)	
576p (PAL)	

The driver supports manual overscan correction for component and DVI outputs. See the online NVIDIA Control Panel Help for instructions on how to use the overscan correction features.

APPENDIX B NVIDIA TESLA COMPUTE CLUSTER MODE

This chapter describes the Tesla Compute Cluster (TCC) mode.

- "About Tesla Compute Cluster Mode" on page 44
- "Operating on Systems with non-TCC NVIDIA GPUs" on page 46
- "Setting TCC Mode for Tesla Products" on page 46

About Tesla Compute Cluster Mode

TCC Overview

Tesla Compute Cluster (TCC) mode is designed for compute cluster nodes that have one or more Tesla products installed.

Benefits

- TCC drivers make it possible to use NVIDIA GPUs in nodes with non-NVIDIA integrated graphics.
- NVIDIA GPUs on systems running the TCC drivers will be available via Remote Desktop, both directly and via cluster management systems that rely on Remote Desktop.
- NVIDIA GPUs will be available to applications running as a Windows service (i.e. in Session 0) on systems running the Tesla driver in TCC mode.

TCC Does not Support Graphics Acceleration

- TCC mode does not provide CUDA–DirectX/OpenGL interoperability.

  It is a “non-display” driver, and NVIDIA GPUs using this driver will not support DirectX or OpenGL hardware acceleration.

Running CUDA Applications

- This release of the Tesla driver supports CUDA C/C++ applications and libraries that rely on the CUDA C Runtime and/or CUDA Driver API.
- NVIDIA GPUs running the Tesla driver in TCC mode will be available for CUDA applications running via services or Remote Desktop.
- In this release, all GPUs will be in compute exclusive mode. As a result, only one CUDA context may exist on a particular device at a time.
- SDK applications that use graphics will not run properly under TCC mode. The following are examples of CUDA SDK applications that are not supported:

bicubicTexture	boxFilter	cudaDecodeD3D9	smokeParticles
cudaDecodeGL	fluidsD3D9	fluidsGL	SobelFilter
imageDenoising	Mandelbrot	marchingCubes	volumeRender
nbody	oceanFFT	particles	
postProcessGL	recursiveGaussian	simpleD3D10	
simpleD3D10Texture	simpleD3D11Texture	simpleD3D9	
simpleD3D9Texture	simpleGL	simpleTexture3D	

Operating on Systems with non-TCC NVIDIA GPUs

- NVIDIA GPUs running under TCC mode may coexist with other display devices.
- The Tesla driver is overinstalled over any NVIDIA display driver in the system–the NVIDIA Tesla driver then becomes the only driver for all NVIDIA GPUs in the system.

  If the Tesla driver is uninstalled at a later time, the previous driver is not restored.
- NVIDIA GPUs that do not support TCC mode will appear as "VGA adapters" in the Windows Device Manager and can be used to drive displays.

  Non-supported NVIDIA GPUs can still function as CUDA devices, but the GPU's graphics functionality is not available to applications.

Setting TCC Mode for Tesla Products

The following table shows the default TCC/non-TCC mode for supported Tesla products.

Table B.1 Default TCC Mode for Tesla Products

Tesla Product	Default Mode	Notes
K20Xm	TCC	Windows 7 64-bit, Windows 8 64-bit Windows Server 2012 64-bit
K20c	TCC	Windows 7 64-bit, Windows 8 64-bit Windows Server 2012 64-bit
K20m	non-TCC	Windows 7 64-bit, Windows 8 64-bit Windows Server 2012 64-bit
C1060	TCC	Windows Server 2012 64-bit
C2075	TCC	Windows 7, Windows Server 2008 & Windows Server 2008 R2 Windows Server 2012 64-bit
	non-TCC	WIndows Vista
C2050	TCC	Windows Server 2008 & Windows Server 2008 R2 Windows Server 2012 64-bit
	non-TCC	Windows Vista, Windows 7
C2070	TCC	Windows Server 2008 & Windows Server 2008 R2 Windows Server 2012 64-bit
	non-TCC	Windows Vista, Windows 7
S2050	TCC	
S1070	TCC	
M1060	TCC	
M2050	TCC	
M2070	TCC	
M2075	TCC	

Table B.1 Default TCC Mode for Tesla Products

Tesla Product	Default Mode	Notes
M2070-Q	non-TCC	
M2090	TCC	

To change the TCC mode, use the NVIDIA **smi** utility as follows:

```
nvidia-smi -g (GPU ID) -dm (0 for WDDM, 1 for TCC)
```

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